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## Post COVID-19 vaccination side effects among Mutah University's students, Jordan

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**ABSTRACT**

**Background:** A number of vaccines were introduced to fight the COVID-19 pandemic; however, questions have been raised about their safety. **Aims:** The objective of this study was to assess the adverse effects that students at Mutah University who received various COVID-19 vaccines reported experiencing. **Methods:** A cross-sectional online survey employing a well-designed questionnaire was undertaken to look for any side effects that university students might have experienced after receiving a single or double dose of several COVID-19 vaccines. **Results:** The study sample consisted of 416 university students, of whom 61 percent were women and around 38 percent had COVID-19. In addition, 70.9 percent of research participants received the Pfizer vaccine, 28.1 percent got the Sinopharm vaccine, and just 0.7 percent and 0.2 percent, respectively, selected the AstraZeneca vaccine and the Moderna vaccine. Localized discomfort following injection (reported by 75% of participants), fatigue (reported by 56.6%), headache (reported by 52.4%), myalgia (reported by 49%), fever (reported by 43%), chills (reported by 37.3%), and arthralgia (37.3 percent) were the most common adverse effects. **Conclusion:** Majority of short-term side effects of COVID-19 vaccines are mild. Nonetheless, additional studies are required for evaluating their long-term side effects.

**Keywords:** COVID19, Vaccines, side effects, SARS-CoV-19, pandemic, virus.

### 1. INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has caused the current global COVID-19 disease pandemic that first started in 2019. Efforts were made to combat the pandemic with both preventive and therapeutic approaches. As vaccines are among the most important preventive measures, they have been widely adopted and huge efforts were made to develop vaccines with different designs for the COVID-19 virus eradication, as well as to minimize its spread and severity (Alhazmi et al., 2021). Four types of covid-19 vaccines have been used across the globe, i.e., messenger

RNA vaccines like Pfizer/BioNTech and Moderna, Viral vector vaccines which include AstraZeneca, Johnson & Johnson and Sputnik V, inactivated Virus Vaccines like Sinopharm and Protein Subunit Vaccines (Han et al., 2021; Duduzile and Charles, 2021). Possible side effects of these vaccines includes local symptoms like pain, redness, or swelling at the site of injection (Zahid, 2021), but can be accompanied by tiredness, headache, chills, fever, nausea or muscle pain throughout the rest of the body (Beatty et al., 2021). Rarely, immunization can cause myocarditis, clotting blood disorders, and anaphylaxis (Bhatia et al., 2021; Sarkar et al., 2022; Oster et al., 2021). In Jordan, the use of four vaccines—Sinopharm, Pfizer/BioNTech, AstraZeneca, and Sputnik V—has been authorized (Omeish et al., 2022).

The goal of this study was to evaluate the incidence rates of the short-term side effects following Covid-19 vaccination to those found in other studies.

## 2. METHODOLOGY

For the current cross-sectional investigation, students at Mutah University who had received one of the four COVID-19 vaccines available in Jordan (Pfizer, Sinopharm, AstraZeneca, and Moderna) completed an online questionnaire. The survey was designed in different languages (Arabic and English) and distributed online utilizing the Google format through social media. Only vaccinated students were eligible for participation in the survey. The questionnaire inquired about their gender, history of COVID-19 infections, the type of COVID-19 vaccine received, and any signs and/or symptoms that participants noticed following the administration of COVID-19 vaccine. The data collection was carried-out from 15<sup>th</sup> January to 31<sup>st</sup> January 2022. Ethical approval was obtained from Mutah University ethics committee. In addition, official permission letters were obtained from the deans of the chosen faculties, and each participant signed the informed consent form. SPSS version 23 was used for analyzing the obtained data and the findings were reported as frequencies and percentages.

## 3. RESULTS

### Population characteristics

The study sample consisted of 416 Mutah university students, 61% of whom were female and 38% were infected with COVID-19, while 93 % were healthy (i.e., did not report chronic illnesses. Moreover, 70 %, 28.1 %, 0.7 % and 0.2 % were vaccinated with Pfizer, Sinopharm, AstraZeneca, and Moderna vaccines, respectively, as shown in Table 1.

**Table 1** Population characteristics.

Gender	Male	38.4 %
	Female	61.6 %
History of COVID-19 infection	Yes	38.7 %
	No	61.3%
History of chronic diseases	Yes	6.7%
	No	93.3%
Type of vaccine	Pfizer	70.9 %
	Sinopharm	28.1%
	AstraZeneca	0.7 %
	Moderna	0.2 %

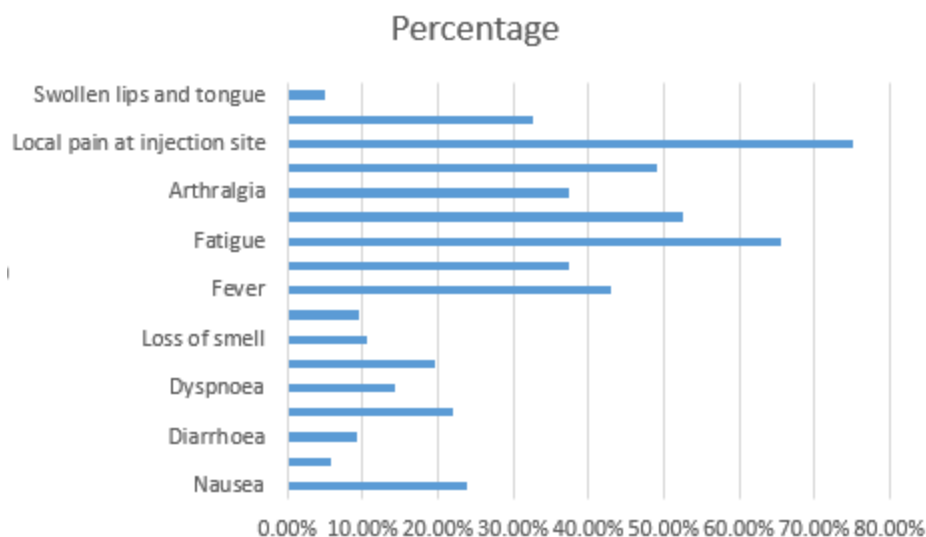
### Reported side effects following COVID-19 vaccination

The reported symptoms included localized pain at the injection site, fatigue, headache, myalgia, fever, chills & arthralgia, itching at injection site and loss of smell & taste (75 %, 65.6%, 52.4%, 49 %, 43 %, 37.3 %, 32.5 % and 10 %, respectively). Gastrointestinal symptoms were also reported by some participants and included nausea (23.8%), vomiting (5.8%), and diarrhoea (9.1%). Cough (21.9%) and sore throat (19.5%) were both reported by about 20% of subjects. Less frequent symptoms including swollen lips and tongue were reported by 5% of subjects, as shown in Table 2 and Figure 1.

**Table 2** Reported side effects following COVID-19 vaccination.

Nausea	23.8%
Vomiting	5.8%

Diarrhoea	9.1%
Cough	21.9%
Dyspnoea	14.4%
Sore throat	19.5%
Loss of smell	10.6%
Loss of taste	9.4%
Fever	43%
Chills	37.3%
Fatigue	65.6%
Headache	52.4%
Arthralgia	37.3 %
Myalgia	49%
Local pain at injection site	75%
Itching at injection site	32.5%
Swollen lips and tongue	5%



**Figure 1** Reported side effects following COVID-19 vaccination.

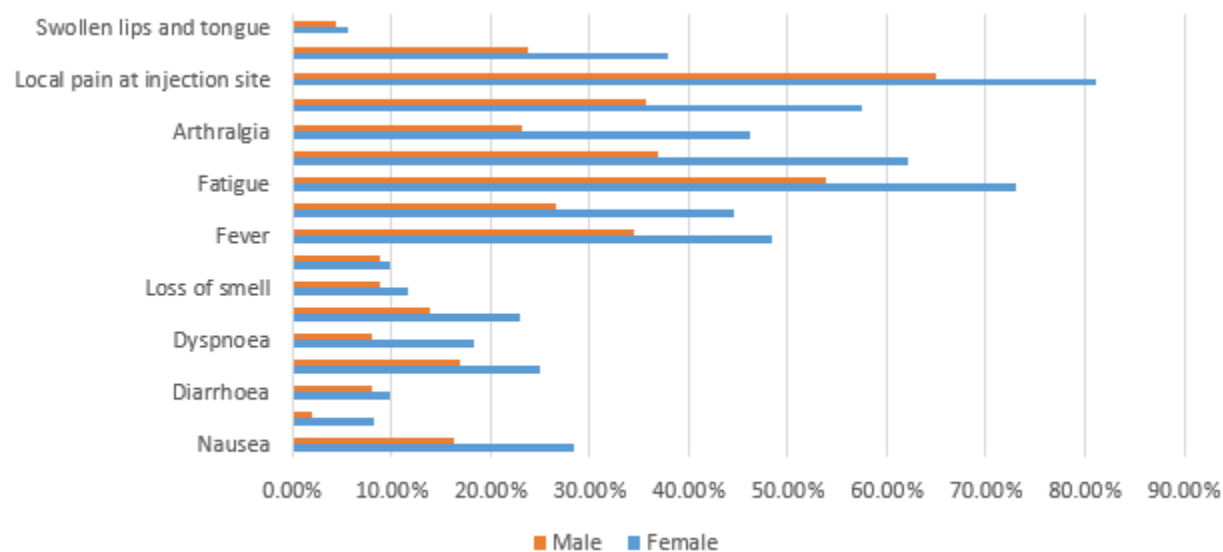
#### COVID-19 vaccine side effects by gender

Females were shown to be more likely to experience COVID-19 vaccination adverse effects when the symptoms reported following COVID-19 vaccines were analyzed by gender, as shown in Table 3 and Figure 2.

**Table 3** COVID-19 vaccine side effects by gender.

Side effects	Female	Male
Nausea	28.5%	16.2%
Vomiting	8.2%	1.9%
Diarrhoea	9.8%	8.1%
Cough	25%	16.9%
Dyspnoea	18.4%	8.1%
Sore throat	23%	13.8%
Loss of smell	11.7%	8.8%

Loss of taste	9.8%	8.8%
Fever	48.4%	34.4%
Chills	44.5%	26.6%
Fatigue	73%	53.8%
Headache	62.1%	36.9 %
Arthralgia	46.1%	23.1%
Myalgia	57.4%	35.6%
Local pain at injection site	81.2%	65%
Itching at injection site	37.9%	23.8%
Swollen lips and tongue	5.5%	4.4%



**Figure 2** COVID-19 vaccine side effects by gender.

#### Side effects related to individual vaccines

Pfizer vaccine (70.9%) was administered to the majority of research participants, and then Sinopharm vaccine (28.1%). Analysis of the data showed that participants who received the Pfizer vaccine experienced more side effects than those who received the Sinopharm vaccine, as shown in Table 4 and Figure 3.

**Table 4** Side effects related to individual vaccines.

Side effects	Pfizer	Sinopharm
Nausea	27.1%	15.4%
Vomiting	6.1%	4.3%
Diarrhoea	9.8%	6.8%
Cough	24.7%	14.5%
Dyspnoea	16.3%	9.4%
Sore throat	23.1%	10.3%
Loss of smell	11.2%	8.5%
Loss of taste	9.8%	7.7%
Fever	50.5%	22.2%
Chills	44.4%	18.8%
Fatigue	74.2%	43.6%
Headache	61%	31.6%
Arthralgia	43.4%	21.4%

Myalgia	55.6%	32.5%
Local pain at injection site	82.7%	55.6%
Itching at injection site	38.3%	16.2%
Swollen lips and tongue	5.4%	3.4%

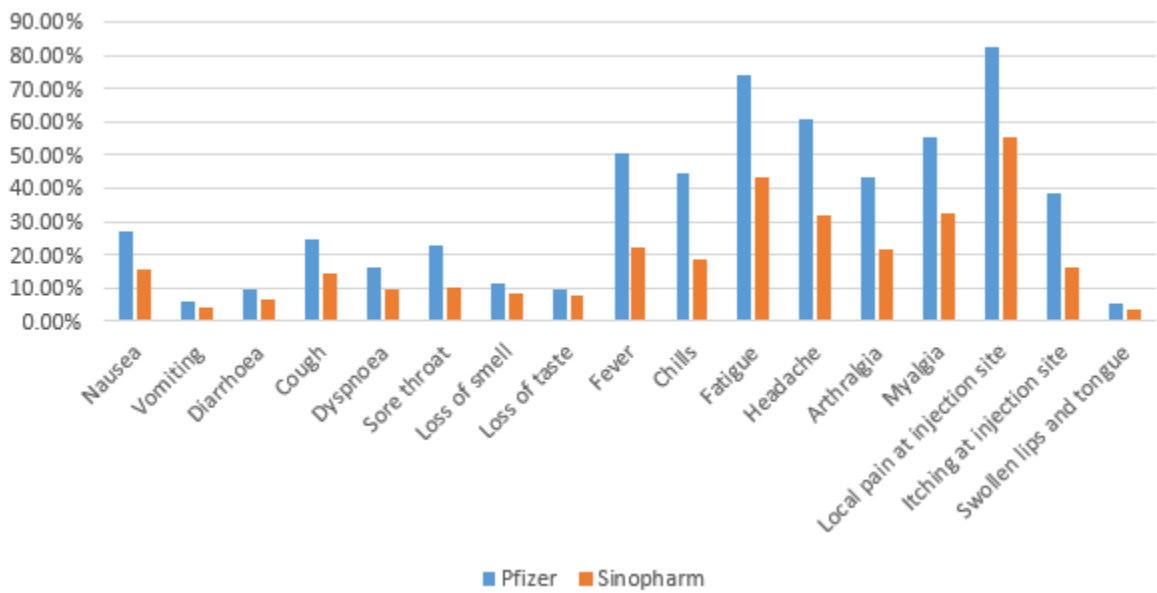


Figure 3 Side effects related to individual vaccines.

4. DISCUSSION

The BNT162b2 mRNA vaccine has caused patients to experience more severe allergy reactions than BOBBI-CorV (inactivated viral vaccination), indicating that it causes a higher immune and inflammatory response in the body (Jonathan and Cecile, 2021; Hatmal et al., 2021). According to the data provided by the study participants, local site reaction and pain was experienced by 75%, fatigue by 65.6%, myalgia by 49%, and fever by 43% of the sample. These results were in agreement with those obtained inCzech Republic studies based on 922 participants. The authors of these studies found that pain at the injection site was most common (89.8%), followed by fatigue (62.2%), muscle pain (37.1%), and chills (33.9%) (Riad et al., 2021a; Riad et al., 2021b).

According to the findings obtained in Slovakia based on 522 participants, BNT162b2 vaccine produced similar side effects (Riad et al., 2021b; Chapin-Bardales et al., 2021). Similar to this study, tiredness (54.2 percent), muscle soreness (28.4 percent), and chills (26.4 percent) were less frequent, with injection site pain (85.2 percent) being the most frequent local side effect. In other studies, focusing on BOBBI-CorV vaccine, where the sample was predominantly male, the adverse effects were substantially milder and included fatigue (16.3%) and discomfort at the injection site (32.6%) (Hatmal et al., 2021; Balsam et al., 2021). The available data shows that the majority of COVID-19 vaccine side effects are mild and disappear on their own two weeks after vaccination (Andrzejczak-Grządsko and Donderska, 2021; Balsam et al., 2021; Chapin-Bardales et al., 2021; Jayadevan et al., 2021; Kadali et al., 2021; Raid et al., 2021b).

This study contributes to the ongoing research aimed at providing reliable evidence to the public in order to reduce hesitancy related to vaccination (Riad et al., 2021c). The study's primary limitations include its limited sample size and the young age of the subjects, who were only recruited from one nation. Therefore, larger and more varied samples are needed to support the results.

5. CONCLUSION

The majority of the short-term adverse effects were modest, according to the online questionnaire utilized in this study, indicating that the current vaccines are generally safe. However, more research is necessary to assess the long-term side effects.

Acknowledgment

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# Ethical considerations

The study was approved by the Ethics Committee, Faculty of Medicine, Mu'tah University, Jordan (reference no 342022).

# Informed Consent

An informed consent was obtained from each subject enrolled in the study.

# Funding

This study has not received any external funding.

# Conflicts of interest

The authors declare that there are no conflicts of interests.

# Data and materials availability

All data associated with this study are present in the paper.

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